Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A turret tool holder of the kind referred to wherein the pawl is continuously pressed against the ratchet by a spring pressed piston located in a pocket in the tool holder arm and engaging the pawl or a projection thereon, substantially as described.

2. In a turret tool holder as claimed in Claim 1, the hereindescribed arrangement of clamping means for clamping the tool holder.

3. A turret tool holder constructed and arranged substantially as described with reference to the annexed drawings.

Dated this 8th day of September, 1916.

CRUIKSHANK & FAIRWEATHER, LIMITED,
Harold Cruikshank Fairweather,
Director,
65—66, Chancery Lane, London, W.C., and
62, Saint Vincent Street, Glasgow,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1916.

101,697

PATENT SPECIFICATION

Convention Date (United States), Oct. 1, 1915.

Application Date (in the United Kingdom), June 8, 1916. No. 8110/16.

Complete Accepted, June 7, 1917.

COMPLETE SPECIFICATION.

Improvement in Mechanically Operated Diaphragm Horns.

We, BEVIN BROS. MANUFACTURING COMPANY, a corporation organized under the laws of the State of Connecticut, one of the States of the United States of America, and having a principal place of business at East Hampton, in the State of Connecticut, United States of America, the Assignees of ERIC MOARD, a citizen of the United States of America, of East Hampton, Connecticut, aforesaid, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to mechanically operated diaphragm horns of the type wherein the diaphragm is agitated by striking mechanism connected by pawl and ratchet gear to a coiled spring put under tension by a pull on a cord or the like flexible connection.

The present invention comprises improvements in devices of the indicated type pertaining to the arrangement of the mechanism for actuating the diaphragm, and to details of construction of the device.

Referring to the drawings:

Fig. 1 is a sectional view with parts broken away to illustrate the construction.

Fig. 2 is a front face view of the main casing and mechanism with the diaphragm removed.

Fig. 3 is a detail face view of the rear plate bearing the mechanism.

Fig. 4 is a detail sectional view through the main driving shaft and appurtenant parts.

Fig. 5 is a detail face view of the gears and rear plate, the front plate being removed.

Fig. 6 is an interior face view of the spring barrel.

Fig. 7 is a fragmentary view of the diaphragm showing the anvil or hammer which is engaged by the actuating cam.

Fig. 8 is a sectional view through the cam spindle and appurtenant parts showing the adjustments thereof.

The mechanism is entirely enclosed in a suitable casing and is made adjustable from the exterior of said casing.

In the drawings, the numeral 1, denotes a horn or resonator which is secured to a cup-shaped flange 2, between which and a flange 3, of a cylindrical casing 4, is clamped a diaphragm 5.

The diaphragm 5, bears a hammer or anvil 6, which as illustrated in Fig. 7, consists of a plate portion 7, with the struck up anvil portion 6. The plate 7,

is secured to the diaphragm by rivets 8. This anvil 6, is of course of hardened material and is struck by an actuator or cam 9.

A suitable bracket is provided for supporting the horn structure in any desired position. The bracket is not illustrated in the drawings.

It is to be understood that the form of the casing, bracket and horn or resonator may be varied to suit various tastes in designs.

As illustrated herein, the main casing is of cylindrical form, and the entire mechanism, with the exception of the pull cord and appurtenant parts, is arranged within this casing and may be adjusted bodily therein, in order to bring the cam 9, into a more or less close juxta-position with reference to the anvil 6, of the diaphragm.

The entire mechanism is supported in a frame-work consisting of a pair of plates 10, 11. These plates are spaced apart by tubular members 12, through which pass bars or rivets 13, which clamp the plates against the spacers 12.

The main driving shaft 14, is supported between the two plates, as best illustrated in Fig. 4, and has loosely mounted upon it a driving gear 15, which is provided with a spring-pressed pawl 16. This pawl engages a ratchet 17, which is secured to the shaft 14. The spring 18, passes through the gear 15, and has one end 19 engaging the tail 20, of the pawl 16, while the opposite end 21 of the spring extends through a perforation in the gear. By this arrangement an extremely long pliable spring is made effective between the gear and the pawl.

The plate 11, has radially punched out flanges 22, which as illustrated herein, are three in number, and serve as adjusting points over which one end of a spring 23, may be secured.

This spring 23, passes about a spring drum or bushing 24, which is secured to a spring casing 26. The inner end of the drum or arbor 24, is slotted as at 27, to engage shoulders 28, formed upon an enlargement of the spindle 14. This effects a permanent clutch between the casing 26, and the spindle 14.

The casing 26, is of cup form and encloses the spring and spring drum. This casing has struck out lugs 29, to which the outer end of the spring 23, is attached. The ends of the spring are of hook form so that, while one end engages one of the lugs 29, and the casing 26, the other end will engage one of the struck up lugs 22, of the plate 11.

It will be seen from this arrangement that various adjustments for tensioning the spring 23, are possible; inasmuch as said spring may be attached to either of the lugs 29, and to either of the lugs 22, and by then turning the spring drum 24, until its slot 27, engages with the shoulders 28, an adjustment of wide range may be secured.

A lug 30, is struck out of the casing 26, and projects into a perforation 31, formed in a disk 32. The disk 32, with a co-operating disk 33, and intermediate hub 34, serves as a winding drum for a cord 35.

This pull cord 35, is wound upon the winding drum under the influence of the spring 23, which rotates the casing 26, winding drum and the spindle 14, under the ratchet 17 and pawl 16.

When the cord is pulled and unwound from the drum, it rotates the spindle 14, and through the ratchet and pawl 17 and 16, drives the gear 15.

The gear 15, meshes with a pinion 36, upon the cam spindle 36^a.

This spindle and its pinion 36, have a loose play between fixed bushings 37, 38, which are respectively fixed in the plates 10 and 11. The bushing 38, extends through the plate 11, and also passes out through a perforation 39, in the rear end of the casing 4. It serves as a long bearing for the spindle shaft 36^a, which is adjustable therein.

A thrust bearing consisting of an adjusting screw 40, with a check-nut 41, is arranged to determine the end play of the spindle 36^a.

The inner end of the spindle 36^a, bears the cam 9, which is preferably secured

to an enlarged hub 9^a, which gives stability and weight to the cam in its striking action upon the anvil 6.

It is to be understood that the casing 26, passes out through a perforation in the rear of the cylindrical casing 4, so that any adjustment of the mechanism toward and away from the diaphragm 5, is made possible.

The front plate 10, has rearwardly turned lugs 10^a, having screw threaded openings by which locking screws 10^b, may be utilized to lock the mechanism to the casing 4, in any desired position of adjustment. Slots 4^a, are provided in the casing through which the screws 10^b, extend and along which adjustment may be effected. This provides a means for bodily adjusting the mechanism with reference to the diaphragm and the anvil 6.

In order to secure finer adjustments so that the exact and proper striking force may be delivered by the cam 9, to the anvil 6, the adjusting screw 40, is employed.

It will be seen from the above described arrangement of parts, that with the cord 35, wound upon the drum, a quick pull upon the cord will instantly transmit very rapid rotation to the cam 9. The instant the pull upon the cord is released, the spring 23, winds the cord back upon the drum, allowing the gear 15, pinion 36, and cam 9, with appurtenant parts, to continue their rotation in the same direction in which they were propelled by the pull upon the cord.

It will be apparent from the above that by manipulating the cord, any desired degree of force may be applied for driving the gears and the cam 9, and it will be equally apparent that an initial force of considerable intensity can be applied, or by rapidly pulling upon and releasing the cord, the mechanism may be maintained at a state of high speed.

In fact, the manipulation of the device is entirely under the control of the operator, and therefore any desired intensity of signal tone may be produced.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A mechanically operated diaphragm horn of the type referred to having its driving spring secured to and enclosed by a supplementary casing extending beyond the main casing, the winding drum being external to the supplementary casing.

2. A mechanically operated diaphragm horn as claimed in Claim 1 wherein the striking mechanism is adjustable with and independently of the gear frame so as to effect a fine and coarse adjustment of the striker, substantially as described.

3. A mechanically operated diaphragm horn constructed and arranged as described with reference to the accompanying drawings and for the purposes stated.

Dated this 8th day of June, 1916.

F. W. GOLBY,
Patent Agent,
36, Chancery Lane, London, W.C.,
Agent for the Applicants.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1917.

the vibrations are transmitted between the earth and an electrical apparatus adapted to produce in an electric circuit currents congruent with the earth vibrations, through a separate liquid or solid sound conducting element or body in good conductive relationship with the earth and so arranged as to produce a difference of phase in the vibrations at different parts of the said apparatus.

2. Apparatus as claimed in Claim 1, having electrical receiving and signal producing means through either of which the aforesaid electric circuit may be completed, for the purpose specified.

3. Apparatus as claimed in Claim 1, mounted to turn around an axis or around different axes, for the purpose specified.

4. Apparatus as claimed in Claim 1, having a pair of vibration receiving devices in a liquid container in the earth, which devices are mounted to turn around vertical and horizontal axes, for the purpose specified.

5. Apparatus for use in detecting or transmitting earth vibrations arranged and adapted to operate substantially in the manner hereinbefore described with reference to any one of the examples illustrated in the accompanying drawings, for the purpose specified.

Dated this 3rd day of August, 1916.

HASELTINE, LAKE & Co.,
28, Southampton Buildings, London, England, and
55, Liberty Street, New York City, U.S.A.,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1917.

511

101,699

PATENT SPECIFICATION

Convention Date (France), Oct. 4, 1915.

Application Date (in the United Kingdom), Aug. 11, 1916. No. 11,377/16.

Complete Accepted, Nov. 11, 1917.

COMPLETE SPECIFICATION.

Improved Apparatus for Automatically Controlling from a Distance Variable Speed or Reversible Engines.

I, Léon Joseph Crèplet, of 7, rue Scribe, Paris (Seine), in the Republic of France, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to variable speed and reversible engines and to long or short distance controlling means therefor and the said invention has for its object to provide improved means for controlling such engines.

In the Specification of British Letters Patent No. 16,673 A.D. 1913 it is stated that the speed of reversible engines depends on the value of excitation of the dynamo actuated by the engine to be regulated or on the value of the voltage of the external source.

Figure 1 is a diagrammatic illustration of controlling means in accordance with the present invention.

Figure 2 shows diagrammatically the application of the invention to a set of ship's driving turbines.

Figure 3 shows the application of the invention to a hauling machine, and

Figure 4 is a graphic illustration of the principle of the invention as applied to the hauling machine.

According to the present invention the control is effected by adjusting the value of the excitation circuit of an electric motor driving the governor and used in combination with a dynamo actuated by the engine or machine it is desired to control, the excitation value of the dynamo and the value of the external voltage being maintained constant. The adjustment of the excitation circuit of the motor is effected, for example, by means of a variable resistance inserted into the electro-magnetic circuit. The sliding contact with which this resistance is provided decreases or increases the amount of resistance traversed by the current. Each position of the sliding contact corresponds to a definite speed of the governor, and, all other data remaining the same, to a definite speed of rotation of the engine or machine.

In practice, the governor R of the engine A to be regulated is actuated at a constant speed (or rather at a speed variable between very narrow limits) by an electric motor *m*. This motor receives its current from a source E at constant potential, but in the circuit of this motor there is inserted a dynamo *d* driven by the engine A, the speed of which is therefore proportional to that of the engine. The dynamo *d* has its exciting circuit connected as a shunt to the source E, so this excitation is constant, and consequently the dynamo pro-

[*Price* 6*d*.]

duces a difference of potential D proportional to its speed of rotation, and therefore to that of the engine A to be regulated.

The connections are arranged in such a way that the difference of potential D of the dynamo d may be constantly opposed to the fixed difference of potential E, for which purpose there is inserted at the terminals of d a reversing key or any other device for the purpose of reversing the current when the engine A runs in the reverse direction.

Under these conditions, the difference of potential V at the terminals of the motor m actuating the governor will always be equal to E – D. Therefore assuming first of all that the excitation current of the motor m is constant, when the speed of A increases, D will increase also, that is to say, E – D will decrease, the motor m will slacken, and the sleeve of the governor will sink, closing the valve P or diminishing the admission in such a way as to bring the engine A back to its normal. The contrary will obviously occur if the engine A happens to slacken.

Assuming that it is now desired to alter the normal speed, that is to say, the standard of running.

One then acts on the field magnet h of the motor m of the governor. With this end in view a variable resistance r is inserted in the circuit of h, which is mounted as a shunt to the source E.

The resistance r may be modified by a sliding contact carried by the controlling lever L located within reach of the driver's hand.

It will be seen that if the resistance r is diminished for instance, the fall of potential at the terminals of the field magnet h will increase. Consequently the excitation of the motor m will increase similarly, and its speed will diminish in such a way as always to be in proportion to the voltage V = E – D which supplies it with current.

But then the sleeve of the governor will fall, the valve P will close, the speed of the motor A will slacken, and the difference of potential D at the terminals of the dynamo d will become lower. It follows that the voltage V = E – D will increase up to the point where it becomes sufficient to give the motor m the speed imposed on the governor, starting from which moment the latter will fulfil its function as in the previous case by regulating the engine at its new normal speed.

The resistance R is arranged in such a way that at L^0 the motor A is completely stopped.

Let it be supposed for example:

1. That the dynamo e, the voltage E of which is constant, supplies 240 volts.
2. That the dynamo d, the excitation of which is constant, supplies 120 volts when the shaft a run at its maximum speed.
3. That the direction of the electromotive force D of d be opposed to that of E so that the voltage V at m the motor be always the difference E – D and equal to 120 volts at the full speed of the machine A.
4. That the governor R revolves at a normal speed of 240 revolutions per minute for which the admission of the steam corresponds to the load on the machine when the excitation of the electromagnetic circuit h of the motor m is a minimum and V equal to 120 volts, the variation of speed from zero to 5% of the governor being neglected according as to whether the sleeve is at the upper limit or the lower limit of its travel.

While the load on the machine A does not vary, its number of revolutions is constant; and V remains invariable as well as the speed of R so long as the resistance r be not touched. If the load on the machine increases, for example, a slows down, D diminishes and V increases accordingly, R then accelerates and acts on the valve gear or on the throttle at P, through a system of rods actuated so as to increase the admission of steam if the governor accelerates, and *vice versa.* In consequence of this special operation, each time the machine becomes irregular, the number of revolutions of R is affected by the variations

of load on the machine, but in the reverse direction and the governor acts upon the valve gear which it adapts to each new value of the load on the machine.

If it be desired to modify the range of speed, the cursor or runner or rheostat arm r is moved. For example if the magnetisation of m be increased by 50%, R will proceed to slow down to $\frac{240 \times 100}{150} = 160$ revolutions per minute. The sleeve descends and cuts off the admission of steam. The machine A slows down, D decreases in value and V increases up to the value, 180 volts at which value m regains its normal speed. The machine is then regular. As D then supplies $240 - 180 = 60$ volts the dynamo d slows down to half its normal speed.

By operating r so as to double the magnetisation of m R drops to 120 revolutions per minute, the machine A slows down until it stops because R recovers its normal speed only when V has risen to 240 volts which requires that D be equal to zero; in which case the machine is stopped. This will be appreciated when it is understood that motor m was giving 240 revolutions per minute at 120 volts at the terminals of the armature. The magnetic flux is doubled, the speed of m falls to $\frac{240}{2} = 120$. In order to recover its velocity of 240 revolutions per minute, m will have to have a difference of potential at the terminals double of what it had before, that is to say, 240 volts. Now the source E is giving 240 volts constantly, so the electromotive force in opposition D should be 0°, consequently the machine A is stopped.

All the intermediate speeds are obtained by moving the resistance member r so that the magnetisation of m varies from normal value to double this value.

The governor may be installed to act either as a means for limiting speed or as an adjuster of speed.

When used as a speed regulator, the apparatus can be used not only to limit the speed, but to constantly govern the machine, the mechanic operating the resistance or rheostat arm which is then independent of the machine A (see Figure 1).

The governor acts on a throttle P, Figure 1, which controls the admission of the motive fluid either to the cylinders of piston engines or to the inlet ports of turbines. The mechanism interposed between the sleeve of the governor and the member which it works is known and varies according to the designer, in any case here it presents the peculiarity shewn in Figures 1 and 3 of opening when the governor accelerates and *vice versa*.

All the desired speeds are obtained by operating the lever L (see Figure 1).

For the position L^0, the speed of the governor is such that its sleeve is down. The admission is nought and in consequence the machine is stopped. By moving L towards L^1 the governor accelerates, admits the steam and causes the machine to start which acquires a standard speed which increases as the lever L is moved further over. In the position L^1, the resistance r inserted is at its maximum position, so as to give the most rapid standard of running of the machine.

When the machine is reversible, in the case of piston motors, any existing device may be retained to alter the direction of rotation, for which reason it is not shewn. The dynamo d (see Figure 1) is provided with a reversing commutator for maintaining the direction of its electromotive force opposed to that of the external source E. The operator has at his disposal, over and above the reversing lever, the lever L (see Figure 1) which, by reason of the governor R and the throttle P, regulates the pressure of the steam so as to keep the machine up to a speed which corresponds to each position of the lever L.

Reversible machines of the turbine type such as those of ships have (see Figure 2) for each shaft rotating in both ways, a go-ahead turbine T^1 and a go-astern turbine T^2.

Each turbine is provided with a governor R^1, R^2 acting on the distributing device P^1 or P^2 through the intermediary of an oil servomotor y^1 or y^2 and valve

gear x^1 x^2. This servomotor and valve gear are identical with those in use for turbines of electricity generating sets of constant speed.

The mechanical operation of these parts is such that the sleeve of the governor admits all the steam or cuts it off according as it is at the top or the bottom of its travel.

The motors m^1 and m^2 of the governors are connected up to the distribution board of electricity, the voltage being E, but the current passes previously through the dynamo d driven by the propeller shaft.

The controlling apparatus Q operated by the captain presents the aspect of the existing ships telegraph apparatus. Its handle L has a contact arm (represented by shading) which bears on the terminal t and on the two resistances r^1 r^2 in series with the electromagnetic circuits of the motors m^1 and m^2.

When the handle is at L^0 the excitation current is the same for the two motors. When the handle moves to L^1, the magnetisation of m^1 is reduced and that of m^2 is maintained constant, the resistances r^1 r^2 being in series with the field magnets of the motors m^1 m^2, as shewn in the drawing. The reverse happens when the handle is at L^2.

By the reversing commutator hereinbefore referred to, the electromotive force D of d is always opposed to the external voltage E. At the motors m^1 m^2, there will be 240 volts when the screw is stopped and $240 - 120 = 120$ volts when the screw revolves at full speed ahead or astern.

The governors are regulated so that their sleeves are down with the distributor closed for 240 revolutions per minute, and in the up position with the distributor open for 250 revolutions per minute.

The resistance r^1 and r^2 are of such dimensions that when the screw is stopped, that is to say when the pressure is 240 volts at the motors m^1 m^2, the governors make 240 revolutions per minute for R^1 and 240 revolutions per minute for R^2 the handle being then at L^0, 500 revolutions per minute when the handle is at R^1 and 240 for R^2 when the handle is at L^1; 240 revolutions per minute for R^1 and 500 revolutions per minute for R^2 if the handle be at L^2.

This being so, if the handle be brought from L^0 to L^1, R^1 accelerates and opens the distributor P^1 and the screw begins to turn in the ahead direction. R^2 slows down due to the fact that the pressure at the motors diminishes gradually. At full speed it falls to 120 volts which gives for the speeds of the governors:—

$$\frac{500 \times 120}{240} = 250 \text{ revolutions per min. for } R^1.$$

$$\frac{240 \times 120}{240} = 120 \quad ,, \quad ,, \quad ,, \quad ,, \quad R^2.$$

The distributor P^1 is wide open and the astern one P^2 remains closed. If the screw tends to race owing to heavy weather for example, R^1 slows down by reducing the steam which will bring the speed within the limit imposed. It will be understood that for any intermediate position of the handle L, the screw takes on a speed proportional to the angle of displacement of L.

To go astern it suffices to move the handle towards L^2. The turbine T^2 then works while T^1 remains inoperative.

If the screw is running full speed ahead and it is desired to reverse its speed of rotation very rapidly it suffices to bring the handle from L^1 to L^2.

If from L^1 to L^{11} the magnetisation of the motor m^1 is reinforced in the proportion of $\frac{250}{240}$ that is to say by 4% m^1 slows down and falls to 240 revolutions per minute, all steam is cut off from the turbine for go-ahead, which shews that a slight movement of the handle suffices to cause slowing down.

In the case where the captain reverses his handle from L^1 to L^2 instantaneously, that is to say before the screw has had time to slow down, the governors will have at the end of the operation 120 volts at their motors, that

is to say the half of 120 volts or 60 each. Their speeds will therefore be less than those admitted above with the screw at rest and the handle at L^2. We thus have:—

$$\frac{240}{2} = 120 \text{ revolutions per minute for } R^1 \text{ and}$$
$$\frac{500}{2} = 250 \quad ,, \quad ,, \quad ,, \;,, \; R^2$$

which shews that the astern valve or distributor is open and steam is coming in the opposite direction. The steam in the opposite direction begins to apply itself for the position L^{12} symmetrical to L^{11}.

Under the effect of the counter steam the screw goes on slowing down rapidly, causing the voltage at the motors of the governors to increase, which attains 240 volts at stoppage. We have therefore.—

240 revolutions per minute at the governor R^1 and
500 ,, ,, ,, ,, ,, ,, R^2.

The astern turbine maintains a full inlet; it starts the screw, the voltage diminishes at the motors of the governors, the speed of which tends towards 120 revolutions per minute for R^1 and 250 revolutions per minute for R^2. At this moment equilibrium is established.

As a speed limiter. When the system is utilised in this case, it only intervenes when the number of revolutions of the machine exceeds the prescribed values or standard and it remains inactive while the number of revolutions are below that required by the said standard. This is the case with hauling machines, lifts, tramways, *etc.*

The speed limiting apparatus has five functions to fulfil.

1. At the beginning only to intervene to avoid shocks and sudden accelerations.

2. When the speed becomes constant, to prevent its exceeding a fixed value.

3. Starting from a certain position of the load, to cause the machine to slow down gradually to arrive at the end aimed at slowly.

4. If by reason of inattention or wrong manœuvring on the part of the attendant, the limit is exceeded, to stop the machine before any damage is done.

5. To modify the standard of running according to the circumstances of working, the nature of the load, *etc.*

Briefly stated, a speed-regulating device capable of acting at a distance for variable speed and reversible engines, is employed in which there is arranged, for the purpose of actuating the centrifugal governor at a sensibly constant speed at all normal speeds of the engine, an electric motor supplied with current by a circuit coming from a source at constant voltage in which there is inserted a constant-excitation dynamo driven by the motor to be regulated, and the electromotive force of which is opposed to the voltage of the source, in such a way, that the speed of the motor of the governor increases when that of the dynamo diminishes and conversely in order to cause the said governor to act in the desired manner, on the regulating apparatus of the engine, while, for regulating the engine at the various normal speeds and directions, the arrangement employed consists of a resistance inserted in the field magnet circuit of the motor of the governor, the resistance being capable of being increased or diminished by a lever under the control of the driver or engineer, in such a way that the motor is limited to a speed corresponding to the desired speed of running of the engine to be governed in the manner described.

To carry out the first four conditions the sliding contact is rendered integral with the operating handle by means of suitable mechanical connections, while yet being also under the control of the reversing lever.

Figure 3 shows a winding or hauling machine A in which the shaft a actuates the arm r by means of a counter crank gearing, gear wheels and chains. It is arranged so that r makes nearly a complete revolution when the cage passes through the entire depth of the pit.

The governor R acts upon a throttle P connected to the steam supply and upon the throttle F for working the brake. The rods interposed between the sleeve and the throttle P work this latter by a spring t which is compressed after the throttle P is closed so as to permit the governor to apply the brake when the sleeve is down in the position z.

When the sleeve is at x the governor makes for example 245 revolutions per minute and the throttle is P open and the brake off.

When the governor drops from 245 to 240 revolutions per minute, the sleeve descends from x to y closing the throttle P.

If the governor continues to slow down passing from 240 to 235 revolutions per minute, the sleeve descends from y to z, compressing the spring t and turning the valve F of the brake which is applied the harder the more F is turned.

It should be noted that when the throttle P is shut, it allows enough steam to leak past to permit the mechanic to work the engine at all times but at a very low speed.

The reversing lever L is connected in the usual way to the shaft C which reverses the valve gear by a known cam or slide mechanism. An additional roller g is attached to the shaft C. Each time the lever L is moved, the roller bears on the chain which is sufficiently loose (see the position in full lines) to yield under the effort, which produces a certain movement of the arm r. This movement, when the cage is at the bottom of its travel, and the lever is pushed from L^1 to L^2, causes the arm r to pass from m^3 to m^4, (the resistance of the machine A hindering the chain from turning at the opposite end) which causes the governor to accelerate and admit steam.

If the lever L is pushed to L^3 in the opposite direction, g goes to g^3 and r to m^5. Consequently the regulator slows down, its sleeve falls to z and the brake goes on preventing the machine from starting in the wrong direction.

The arc m^3, m^4 is calculated so that the throttle opens sufficiently for a rapid start without being dangerous.

Between m^3 and m^2 the arm r tends to cause the governor to accelerate. The machine accelerates, the period of starting being represented at O. Starting from m^2, the arm r no longer modifies the excitation of the motor m; it is the period of constant speed a b (see Figure 5). Starting from m^1, the arm causes the governor to slow down which gradually cuts off the steam. At m^0 the governor closes the throttle. If at this movement the machine is not stopped, the governor slows down further and applies the brake.

Towards the end of the travel, the attendant returns the lever L from L^2 to L^1. If he forgets to do so, the cursor r will arrive at m^0 before the travel is finished and will pass beyond this position. Consequently the governor will slow down and the brake will be applied, thus avoiding all danger.

Each time the machine A reverses its working, the electromotive force D of the dynamo d reverses itself. Now it is necessary that it be always opposed to the voltage E which, itself, is constant. To realise this condition a two-part commutator rotatable in two directions and driven by friction by the belt a may be provided. This commutator is interposed between the armature of d and its outer circuit in such a way that at each reversal of movement it changes the connections.

Such a commutator and its mode of operation are known and form no part of the present invention.

The fifth result is obtained obviously by changing the value of the resistance inserted in the excitation of the motor m of the governor R.

The maximum speed A, a, (see Figure 5) depends on the variation in

magnetisation which the arm r produces, that is to say on the value of the total resistance which it introduces and gradually diminishes.

Let it be supposed that the machine A (see Figure 1) is running at full speed when its dynamo d develops 120 volts. We know that in this case the magnetisation of m is reduced by one half, the relation that ought to exist between the resistance of the field magnet h and the resistance r having been hereinbefore explained at the beginning. If we replace the regulating resistance r by another reducing the magnetisation by one fourth only, the governor will maintain or keep up its 240 revolutions per minute for a dimension of the voltage V (see Figure 1) by one fourth, that is to say $\frac{240}{4}=60$ volts, which represents the maximum pressure of the dynamo d and consequently a speed (A^1 B^1 see Figure 5) of the machine is reduced by half.

If the regulating resistance r be given a still lower value the maximum speed of the machine will be still further reduced, as shewn by the following table given as an example:—

Maximum speed of the machine *per cent.*	-	100	50	25	0
Voltage of the dynamo e volts	-	240	240	240	240
,, ,, ,, ,, d ,,	-	120	60	30	0
,, ,, ,, motor m ,,	-	120	180	210	240
Speed of the governor R. revs. per min. -	-	240	240	240	240
Magnetisation of motor m *per cent.*	-	50	75	87.5	100
Exciting current amp.	-	0.05	0.10	1.007	0.150
Resistance of circuit ($h \times r$) ohms. - -	-	4800	2400	2240	1600
,, ,, electro-magnetic circuit h ohms.	-	1600	1600	1600	1600
,, ,, rheostat r ohms. - -	-	3200	800	640	0

As many regulating resistances r will therefore be provided as there are maximum standard speeds desired, but there will always be only one in service.

Another solution leading to the same result consists in arranging in parallel on a single resistance r a shunt s (see Figure 3) variable by hand by a handle the position of which is changed every time it is desired to modify the standard maximum speed. A combined risistance is thus substituted for the resistance r:

$$R = \frac{r\ s}{r+s}$$

For example to realise the above running standards, admitting that the variable resistance r has a total resistance of 3200 ohms, it is necessary that s shall have the resistance values given below:—

Maximum speed of the machine *per cent.* -	-	100	50	25	0
Value of the combined resistance R = -	-	3200	800	640	0
Value of the combined resistance r -	-	3200	3200	3200	3200
,, ,, ,, ,, ,, s		(infinite)	1070	800	0
Position of the handle of s (see Fig. 3) -	-	S^1	S^2	S^3	S^0

By bringing s successively from S^0 to S^1, the machine will assume all the maximum speeds from zero to A a (see Figure 5).

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

A speed-limiting and speed-regulating device for the regulation and the limitation of the speed of variable-speed or reversible engines, characterised by a centrifugal governor driven at a speed that is practically constant for all the normal speeds of the engine, by an electric motor supplied with current

by a constant-voltage circuit in which is inserted a constant-excitation dynamo driven by the engine to be regulated and the electro-motive force of which is opposed to the voltage of the source of current, in such a way that the speed of the motor of the governor increases when that of the dynamo decreases, and conversely, for the purpose of making this governor act in the desired direction, either directly or else by means of an auxiliary motor, on the governing apparatus of the engine; an arrangement for the governing of the engine at the various normal speeds, which arrangement consists of a resistance inserted in the field-magnet circuit of the motor of the governor, the said resistance being capable of being increased or diminished by a lever placed under the control of the driver or engineer, in such a way that the speed of the motor is limited according to the desired speed of running of the engine to be governed in order to enable it to impart to the governor its normal speed, and a reversing arrangement enabling the same governing to be effected when the engine is running in the reverse direction, substantially as described.

Dated this 11th day of August, 1916.

HASELTINE, LAKE & Co.,
28, Southampton Buildings, London, England, and
77, Liberty Street, New York City, U.S.A.,
Agents for the Applicant.

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101,700

PATENT SPECIFICATION

Convention Date (United States), Oct. 4, 1915.

Application Date (in the United Kingdom), Aug. 22, 1916. No. 11,913/16.

Complete Accepted, July 26, 1917.

COMPLETE SPECIFICATION.

Improvements in or relating to Cloth Cutting Machines.

We, H. Maimin Company, Incorporated, Manufacturers, and a corporation organised under the laws of the State of New York, and having a place of business at 247, West 19th Street, Borough of Manhattan, City, County and State of New York, United States of America, Assignees of David Sidney Maimin, 97, Fort Washington Avenue, Borough of Manhattan, City, County and State of New York, United States of America, Manufacturer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to hand directed motor driven machines with vertical reciprocating cutter for cutting cloth.

The knives in such cloth cutting machines frequently require sharpening and renewal. In order to provide for ready removal of the knife, the knife guard and stripper-foot have been so mounted on the frame of the machine as to swing to one side of the line of cut, but the construction is such that it is difficult to bring the sharpening tool into engagement with the knife, and the use of a stripper-foot extending for any substantial distance behind the front edge of the knife is prevented.

Our invention overcomes this difficulty and provides a greater degree of safety to the operator, by the use of a pair of separate guard members pivotally supported to swing away from the knife to fully expose the edge thereof for sharpening, and also stripper-foot members carried by the guard members and engaging the cloth on opposite sides of the line of cut. Preferably, the stripper-foot consists of two complementary sections extended to overlie the uncut cloth in front of the knife, and also to overlie the cut cloth behind the standard holding the knife, to thereby effectively hold down the cloth in the whole region of the cut. If desired, one of the stripper-foot sections may be extended to form a guiding finger, and the guard members and stripper-foot sections carried thereby, may be vertically adjustable on the motor frame of the machine to provide the desired pressure on the cloth, as by a rack secured to the motor frame and an engaging spring-pressed pawl carried by the carrier member of the guard.

In the drawings illustrating the preferred form of construction

Figure 1 is a side elevation of the complete machine; Figure 2 is a front elevation; Figure 3 is a section on the line 3—3 of Figure 1, showing the

relation of the stripper-foot to the knife and standard; Figure 4 is a detail, in elevation, at 4—4 of Figure 3; Figure 5 is a detail partly in section of the carrier member of the guard and the cooperating parts of the frame; and Figure 6 is a section on the line 6—6 of Figure 5.

The machine has a base plate 1, a standard 2, a motor frame 3, a handle 4, and a knife 5 of standard construction. A rack 6 is secured to the front of the motor frame and is embraced by the carrier member 7 of the combined guard and stripper-foot, which member embraces the rack 6 and is vertically adjustable thereon, engagement between the rack and the carrier being effected by the spring-pressed pawl 8 provided with a handle 9. The two guard members 10 and 11 are secured to the carrier by pivot pins 12 carrying pinions 13 which mesh with one another so that the guard members will move in unison. A coil spring 14 is connected at its ends to these pinions, as shown in Figures 1 and 2, and acts to hold the guard members in the position to which they have been brought by the operator, that is, either the depressed position as shown in full lines in Figure 2 or the elevated position as shown in dotted lines in Figure 2. The blade springs 15 may be employed, as shown in Figure 2, to supplement the action of the spring 14 when the guards are in elevated position. The ends of these springs take over the projections 16 on the guard members, as shown in Figure 2. Secured to the lower extremities of the guard members 10 and 11 are the two complementary sections 17 and 18 of the stripper-foot, and from Figures 3 and 4 it will be seen that the stripper-foot closely embraces the knife and standard and extends along the line of the cut in front of the knife and behind the standard, so as to hold down the cloth throughout the whole region of the cut, for the purpose described. The stripper-foot section 18 is extended in front of the knife and at a slight angle to the line of cut, so that its forward edge will lie on that line and serve as a guide finger so that the operator may easily follow the line marked on the goods. The stripper-foot section 17 carries a pin 19 which is positioned, when the guard members are depressed, to pass through a bearing in the section 18, as shown in Figure 3, and this section 18 carries a spring-pressed pawl 20 adapted to engage a notch 21 in the pin 19 and provided with an operating handle 22.

It will be understood that when the machine is in use, the operator adjusts the stripper-foot to put the desired pressure on the cloth, by pressing down on the carrier 7, the pawl 8 slipping easily over the rack 6 and locking the stripper-foot in the desired position. When it is desired to vary this pressure, the pawl is pulled out by means of the handle 9 and set into another notch of the rack as may be desired. When the operator desires to sharpen the blade, or to remove it, he manipulates the handle 22 to withdraw the pawl 20 from notch 21 in pin 19, and swings the members of the guard outwardly in a plane normal to the line of cut, and upwardly into the position shown in dotted lines in Figure 2. In this position the members are held by the spring 14 and the springs 15. This operation can be carried on without disturbing the pressure adjustment of the stripper-foot, and when the sharpening operation has been completed, the guard members may be swung down into the original position without any alteration of such pressure and without the necessity of any adjustment thereof. The carrier may be readily removed, with the combined guard and stripper-foot, by slipping it off of the lower end of the rack.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1.—A cloth cutting machine of the kind referred to having a knife and a knife-holding standard, characterised by the fact that a pair of separate guard members are pivotally supported to swing away from the knife (preferably in a plane substantially normal to the path of the knife) to fully expose the edge

of the knife for sharpening, and that stripper-foot members are carried by the guard members and engage the cloth on opposite sides of the line of cut.

2.—A cloth cutting machine in accordance with Claim 1, characterized by a stripper-foot carried by the guard members and consisting of two complementary sections shaped to embrace the knife and knife-holding standard, and overlying the uncut cloth in front of the knife and also overlying the cut cloth behind the standard, to effectively hold down the cloth in the whole region of the cut.

3.—A cloth cutting machine as in Claim 2, characterized by the fact that one of the complementary sections of the stripper-foot is extended to form a guiding finger.

4.—A cloth cutting machine as in Claim 1, characterized by the fact that the guard members are pivotally connected to a carrier member which is vertically adjustable on the motor frame of the machine.

5.—A cloth cutting machine as in Claim 4, characterized by the fact that a rack is secured to the motor frame, and that the carrier member embraces the rack and is provided with a spring-pressed pawl engaging the rack.

6.—A cloth cutting machine substantially as hereinbefore described and illustrated with reference to the accompanying drawings.

Dated this 22nd day of August, 1916.

HASELTINE, LAKE & Co.,
28, Southampton Buildings, London, England, and
55, Liberty Street, New York City, U.S.A.,
Agents for the Applicants.

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SPECIFICATIONS

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101,701

PATENT SPECIFICATION

Convention Date (United States), Oct. 4, 1915.
Application Date (in the United Kingdom), Sept. 12, 1916. No. 12,911/16.
Complete Accepted, Sept. 12, 1917.

COMPLETE SPECIFICATION.

Improvements in Washing Machines.

We, NATIONAL BRUSH WASHING MACHINE COMPANY, a corporation organised and existing under the laws of the State of Delaware, United States of America, and having its principal office at Suite 710, Union Bank Building, corner Fourth Avenue and Wood Street, Pittsburgh, Allegheny County, State of Pennsylvania, United States of America, Assignees of WILLIBALD TRINKS, of No. 1410, Denniston Avenue, Pittsburgh, Allegheny County, State of Pennsylvania, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention consists in certain new and useful improvements in rotary brush washing machines and particularly relates to the mounting of the power driven brush, and with which there usually co-operates a backing member or roller, between which and the brush the material to be washed is fed.

The object in view is an inexpensive yet efficient and durable mounting for the brush which will minimise friction, facilitate the installation and removal of the brush from the machine, and permit its reversal when the bristles of the brush have become so bent from use as to trail.

In the accompanying drawings:—

Figure 1 is a vertical section showing the rotary brush and its mounting in the machine.

Figure 2 is a broken side elevation looking toward the left in Figure 1, and

Figure 3 is an end view of the brush, the power shaft being in section along the line III—III in Figure 1.

The following is a detail description of the drawings:—

A and B indicate the side plates of a washing machine frame, the plate A having on its outer face the integral open front gear box 1 provided with a removable front plate 2.

C is a shaft which extends through loosely fitting holes 3 and 4 in the side plates A and B respectively, and also through a hole 5 of a larger diameter in the front plate 2.

6 is an annular flange on the outer face of the plate B concentric with the hole 4. 7 is a ball bearing seated within said flange whose inner member is mounted on the shaft C.

D is a power-driven sleeve member, shown as a bevelled gear, facing outwardly, mounted on the shaft C within the box 1, the outer end of the hub 8 of said gear being journalled in the hole 5 in front plate 2. The outer end of said hub 8 is slotted diametrically to receive a pin 9 which extends through a